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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,322	08/01/2003	Munenori Oizumi	TI-35909	5221

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TEXAS INSTRUMENTS INCORPORATED  
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EXAMINER
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ROSARIO, DENNIS

ART UNIT	PAPER NUMBER
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2624

NOTIFICATION DATE	DELIVERY MODE
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06/10/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com  
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<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/632,322		OIZUMI ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Dennis Rosario		2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2003 & 4/9/07 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/6/08 has been entered. Claims 1-5 are pending.

### ***Response to Arguments***

2. Applicant's arguments, see remarks, page 4, last paragraph to page 5, first paragraph, filed 5/6/08, with respect to the rejection(s) of claim(s) 1-5 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kim et al. (US Patent 5,653,234).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US Patent 5,653,234) in view of Muzilla et al. (US Patent 5,735,797) further in view of Jensen (US Patent 6,859,659 B1).

Regarding claim 1, Kim teaches a method of image filtering, comprising:

(a) computing an autocorrelation (fig. 2, num. 108) in a single direction (or “same direction” in col. 1, lines 43-50) for each pixel (represented in equation (1) as “x” of column 1: “pixels” in col. 4, lines 14-16) in an image (fig. 2: I and Q);

(b) filtering (fig. 2, num. 114) said image with a lowpass filter (fig. 2, num. 114 is a “lowpass filter”: abstract), wherein said filtering (fig. 2, num. 114) adaptively changes (corresponding to “adjustable pass band”: abstract) according to (or based on) the auto-correlation (fig. 2 ,num. 108); and

(c) interpolating (fig. 2:114 outputs an averaged image as indicated in fig. 1: AVERAGED SIGNAL where averaging is a form of interpolating) said image (fig. 2: I and Q) and said filtered image from step (b) (Kim does not disclose interpolating said filtered image from step (b)) wherein said interpolating (fig. 2, num. 114) at said each pixel depends upon (or based on) said autocorrelation (fig. 2, num. 108) in said (same) single direction.

Kim does not teach the claimed:

- a) modified autocorrelation and
- b) interpolating said filtered image from step (b).

Instead, Kim teaches autocorrelation that is “typically”: col. 1, lines 41-50 computed according to said equation (1) and teaches and ARCTAN function in fig. 2, num. 116 following a filtered image upon the output of fig. 2, num. 114 to obtain a velocity measure.

Regarding the claimed interpolating said filtered image from step (b), Muzilla teaches interpolating as shown in fig. 9, num. 124A said filtered image from step (b) represented in fig. 9 as num. 126A: a detailed view in fig. 10 that shows an adaptive filter 136 and 138 which generates the claimed filtered image from step (b) that is subsequently interpolated in fig. 9, num. 124A.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Kim's filtered image of fig. 2, num. 114 of obtaining a velocity measure with Muzilla's teaching of obtaining a velocity measure represented in Muzilla in fig. 9 as VELDATA based on interpolating in fig. 9, num. 124A, because Muzilla's teaching provides a visual display of flow data such as velocity instead of just obtaining velocity as done in Kim. Thus, Muzilla enhances Kim calculation of velocity visually.

The combination still does not teach the claimed modified autocorrelation, but Kim of the combination states that a typical autocorrelation computation is used to obtain a velocity.

Jensen teaches “traditional autocorrelation” in col. 2, lines 5-10 and “standard autocorrelation” in col. 4, lines 46-48 and teaches “a new autocorrelation estimator” in col. 1, lines 15-19, which is the claimed modified autocorrelation, because the new autocorrelation estimator modifies the traditional autocorrelation by introducing equation (26) in column 6 which are used with the traditional autocorrelation equations (24) and (25) in column 5 as discussed in col. 6, lines 6-16.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Kim’s typical autocorrelation with Jensen’s teaching of traditional autocorrelation with the new autocorrelation, because Jensen’s new autocorrelation is “new and improved” in col. 1, lines 60-63.

Regarding claim 5, Muzilla of the combination teaches:

- (a) said image is a color channel of a color image (“color map” in abstract).

5. Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US Patent 5,653,234) in view of Muzilla et al. (US Patent 5,735,797) further in view of Jensen (US Patent 6,859,659 B1) or Jensen I further in view of Jensen (A New Method for Estimation of Velocity Vectors) or Jensen II.

Regarding claim 2, Kim teaches with said image (said I and Q of fig. 2) of step (c) replaced by said interpolated image (upon the output of fig. 2, num. 114) using said modified auto-correlation in said single direction and does not teach the remaining limitations of claim 2 and instead uses the same direction for correlation "for any given direction" in col. 1, lines 20-24.

Jensen of the combination teaches axial and transverse directions determined from autocorrelation functions: column 5: equations (24) and (25) which is an improvement of the prior art as discussed in col. 1, lines 60-63 and the method of claim 1, further comprising:

(a) a single direction (or axial direction) replaced (during estimation of a "Velocity transverse" in col. 2, lines 44-46 that cannot use the axial direction and a transverse direction must be used, thus replacing the axial direction with a transverse direction during estimation of the transverse direction) by a second direction (as shown by any one of transverse arrows of fig. 1), said second direction perpendicular (as shown in fig. 4 that shows axes that are perpendicular) to said single direction (axial direction).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Kim's teaching of autocorrelation at any given direction with Jensen's teaching of axial and transverse directions which would result in the claimed repeating of claim 1 the only difference being a perpendicular direction, because Jensen has identified a "common problem" (Jensen II, page 837, left column) with ultrasound to measure velocity and provides a solution.



6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US Patent 5,653,234) in view of Muzilla et al. (US Patent 5,735,797) further in view of Jensen (US Patent 6,859,659 B1) further in view of Kim et al. (US Patent 5,544,658).

Regarding claim 3, Jensen provides standard autocorrelation and modifies the standard autocorrelation as discussed in claim 1, above.

Kim teaches "modified auto correlation" in col. 3, line 17 and claim 3 of

(a) said modified auto-correlation ("modified auto correlation" in col. 3, line 17) of step (a) of claim 1 is  $R_{xx}(1)/(R_{xx}(0) + \delta)$  (see equation "(1)" in column 3 and equation (9) in column 8) where  $R_{xx}(\cdot)$  is the auto-correlation function for the pixel values in an interval about said each pixel and with the DC component removed (via fig. 5,num. 34), and where  $\delta$  is a parameter (or "variables" in col. 8, line 22).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Jensen's teaching of auto-correlation with Kim's teaching of the modified auto-correlation, because Kim's modified auto-correlation remedies the deficiencies of auto-correlation with respect to "aliasing" in col. 3, line 9 or noise.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US Patent 5,653,234) in view of Muzilla et al. (US Patent 5,735,797) further in view of Jensen (US Patent 6,859,659 B1) further in view of Kim et al. (US Patent 5,544,658) as applied in claim 3, above, further in view of Hall et al. (US Patent 5,363,851).

Regarding claim 4, the combination does not teach claim 4, but Jensen teaches modifying autocorrelation as discussed in claim 1, above.

Hall teaches a modified auto-correlation as shown in fig. 4, num. 60 and claim 4 of:

a)  $R_{xx}(1)/(R_{xx}(0) + \delta)$  (as shown in fig. 4,num. 60) exceeds a threshold (fig. 4,num. 68).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Jensen's teaching of auto-correlation with Hall's modified auto-correlation and threshold, because Hall teaching provides "accurate velocity estimation" in col. 2, line 12.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dennis Rosario/  
Examiner, Art Unit 2624

/Matthew C Bella/  
Supervisory Patent Examiner, Art  
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